Quantum Dance of Electrons in Triangular Na_xCoO_2

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Layered transition metal oxides are in the focus of intense research efforts as they might clarify superconducting mechanism of cuprate high-temperature superconductors (HTSCs). Similar to HTSCs cobaltates represent the case of a Mott insulator doped in electronically active crystal planes formed by Co ions, but on a triangular lattice. This geometrically frustrates the would be antiferromagnetically ordered Neel state present in HTSCs. The interplay of charge and spin degrees of freedom is indeed exciting in cobaltates and leads to a non-monotonous dependence of electronic properties with electrons doping. Na_xCoO_2 with x = 0.7 is a parent compound for such a family of cobaltates that shows unconventional physics with most exciting large thermoelectric power at x = 0.7 and superconductivity at x = 0.3. Using angle-resolved photoemission spectroscopy (ARPES) we performed detailed investigation of low-energy electronic structure and charge dynamics of the parent cobaltate compound Na0.7CoO2 to discover its strongly electron-correlated nature, an indication that charge transport is indeed strongly influenced by spin fluctuations, and relevant parameters important for building a correct quantum model. The results will be discussed in terms of recent first principles calculations.